

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

<i>In re</i> Patent Application of:)	Confirmation No.: 2329
Shunpei YAMAZAKI)	
Application No.: 10/772,586)	Examiner: Thanh T. Nguyen
Filed: February 6, 2004)	Art Unit: 2813
For: METHOD OF MANUFACTURING)	
SEMICONDUCTOR DEVICE AND)	
DISPLAY DEVICE UTILIZING)	
SOLUTION EJECTOR)	Date: December 13, 2006

APPEAL BRIEF

MAIL STOP APPEAL BRIEF – PATENTS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

As set forth in the Notice of Appeal filed October 1, 2006, Appellants hereby appeal the Examiner's final rejection of claims 1-6 and 13-18 of the above-identified application. Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the final rejection of these claims.

I. REAL PARTY IN INTEREST

Semiconductor Energy Laboratory Co., Ltd., is the assignee and real party of interest.

II. RELATED APPEALS AND INTERFERENCES

At present, there are no related appeals or interferences known to the Appellants, the Appellants' representative or the assignee, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

For the purposes of this Appeal, claims 1, 3-6 and 13-18 stand finally rejected and are the subject of this Appeal. On March 13, 2006, Appellant filed an Amendment in response to a non-final Office mailed December 13, 2005, in which claim 2 was canceled and the dependencies of claims 4-6 were amended to conform to the cancellation of claim 2. Claims 7-12 and 19-24 have been withdrawn from consideration as a result of a restriction requirement. Thus, the Appeal is taken from the rejection of claims 1, 3-6 and 13-18, as submitted in the Appendix herewith.

IV. STATUS OF AMENDMENTS

No amendment has been filed after the final Office Action. In response to the final Office Action dated May 30, 2006, Appellant submitted a Request for Reconsideration on October 1, 2006. The Examiner subsequently issued an Advisory Action on October 27, 2006, maintaining all rejections made in the final Office Action.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed subject matter is directed to a method for producing a semiconductor device, as described in the exemplary embodiments set forth in the specification. Appellant's Appeal is taken from claims 1, 3-6 and 13-18, of which claims 1, 3, 13, 14 and 15 are independent.

In conventional methods for producing devices that uses thin film transistor (TFT) technology, such as a display device, a conductive wiring film is typically formed on an entire substrate surface by processes such as photolithography, etching, and ashing or via a vacuum device. However, these conventional processes remove most of the film material from a substrate onto which it is formed. The removed material is considered waste and discarded, which leads to increased production cost of the display device and increased environmental burden (*i.e.*, gas reduction). For example, when depositing a resist film used using a spin coating technique, about 95% of the resist film material is wasted. (See pages 1 to 2 of the specification). At the same time, the industry is driven to further miniaturize semiconductor devices and their associated wiring, and to make devices in which they are used, such as a display screen, increasingly larger.

Thus, in accordance with one aspect of the present invention, a method for producing a semiconductor device having a fine wiring pattern includes, among other things, forming a wiring, forming a resist mask on the wiring using a solution ejector, and etching the wiring layer using an atmospheric-pressure plasma device having a linear plasma generator using the resist mask as a mask.

For example, as shown in Figures 3A-3C and Figures 17A-17C, exemplary processes in accordance with the invention can form wiring by way of a solution ejector and then form resist films (*i.e.*, items 304/305, 2304/2305 in Figures 3B and 17B, respectively) locally on the wiring (items 302/303 and 2303/2304 in Figures 3B and 17B, respectively) using solution ejectors. As shown in each of Figures 4A and 18A, the locally formed resist films are etched using an atmospheric-pressure plasma device having a linear plasma generator (*e.g.*, see items 307 and 2307, respectively), which facilitates forming a fine metal pattern also in a localized fashion (*e.g.*, see items 302/303 and 2303/2304 in Figures 4B and 18B, respectively). These localized wiring and resist formation processes allow for reduced costs associated with film formation material(s) or material(s) used for etching and ashing, and can avoid costs that would be associated with scaling of conventional vacuum processing equipment to produce, for example, the increasing display device sizes demanded in today's market.

Processes in accordance with the foregoing aspect are broadly encompassed in each of Appellant's independent claims 1 and 3:

Independent Claim 1

Independent claim 1 is directed a method for producing a semiconductor device that comprises forming wiring using a first solution ejector for ejecting a conductive material (e.g., see page 2, paragraph 10; page 8, paragraphs 61, 64; page 12, paragraph 90; page 30, paragraph 172 page 31, paragraph 180; and Figures 3A, 13A, 16A and 17A), forming a resist mask on the wiring using a second solution ejector (e.g., see page 8, paragraph 66; page 12, paragraph 92; page 30, paragraph 174; page 31, paragraph 182; and Figures 3B, 13B, 16B and 17B), and etching the wiring using an atmospheric-pressure plasma device having a linear plasma generator using the resist mask as a mask (e.g., see page 9, paragraph 68; page 13, paragraph 94; page 30, paragraph 175; page 31, paragraph 183; and Figures 4A, 13C, 16C and Figure 18A).

Independent Claim 3

Independent claim 3 recites a method for producing a semiconductor device that includes forming wiring (e.g., see page 2, paragraph 10; page 8, paragraphs 61, 64; page 12, paragraph 90; page 30, paragraph 172 page 31, paragraph 180; and Figures 3A, 13A, 16A and 17A), forming a resist mask at least on the wiring using a solution ejector (e.g., see page 8, paragraph 66; page 12, paragraph 92; page 30, paragraph 174; page 31, paragraph 182; and Figures 3B, 13B, 16B and 17B), and etching the wiring using an atmospheric-pressure plasma device having a linear plasma generator using the resist mask as a mask (e.g., see page 9, paragraph 68; page 13, paragraph 94; page 30, paragraph 175; page 31, paragraph 183; and Figures 4A, 13C, 16C and Figure 18A).

In accordance with another aspect of the invention, a method for producing a semiconductor device includes processes utilizing a solution ejector to form at least one of a wiring layer and a resist mask formed on a wiring layer, and etching the wiring using an atmospheric-pressure plasma device having a plurality of linearly-arranged plasma generators using a resist mask as a mask. By using a plurality of linearly-arranged plasma generators,

selective etch processing can be facilitated at any place on a material to be processed to produce fine wiring patterns using reduced amount(s) of gas. These features brought out in each of independent claims 13, 14 and 15, as follows:

Independent Claim 13

Independent claim 13 is directed to a method for producing a semiconductor device comprising forming wiring using a first solution ejector for ejecting a conductive material (e.g., see page 2, paragraph 10; page 8, paragraphs 61, 64; page 12, paragraph 90; page 30, paragraph 172; page 31, paragraph 180; and Figures 3A, 13A, 16A and 17A), forming a resist mask on the wiring using a second solution ejector (e.g., see page 8, paragraph 66; page 12, paragraph 92; page 30, paragraph 174; page 31, paragraph 182; and Figures 3B, 13B, 16B and 17B), and etching the wiring using an atmospheric-pressure plasma device having a plurality of linearly-arranged plasma generators using the resist mask as a mask (e.g., see page 13, paragraph 94; page 31, paragraph 183; and Figures 16C and Figure 18A).

Independent Claim 14

Independent claim 14 is directed to a method for producing a semiconductor device comprising forming wiring using a solution ejector for ejecting a conductive material (e.g., see page 2, paragraph 10; page 8, paragraphs 61, 64; page 12, paragraph 90; page 30, paragraph 172; page 31, paragraph 180; and Figures 3A, 13A, 16A and 17A), forming a resist mask at least on the wiring (e.g., see page 8, paragraph 66; page 12, paragraph 92; page 30, paragraph 174; page 31, paragraph 182; and Figures 3B, 13B, 16B and 17B), and etching the wiring using an atmospheric-pressure plasma device having a plurality of linearly-arranged plasma generators using the resist mask as a mask (e.g., see page 13, paragraph 94; page 31, paragraph 183; and Figures 16C and Figure 18A).

Independent Claim 15

Independent claim 15 recites a method for producing a semiconductor device that comprises forming wiring (e.g., see page 2, paragraph 10; page 8, paragraphs 61, 64; page 12, paragraph 90; page 30, paragraph 172; page 31, paragraph 180; and Figures 3A, 13A, 16A and 17A), forming a resist mask at least on the wiring using a solution ejector (e.g., see page

8, paragraph 66; page 12, paragraph 92; page 30, paragraph 174; page 31, paragraph 182; and Figures 3B, 13B, 16B and 17B), and etching the wiring using an atmospheric-pressure plasma device having a plurality of linearly-arranged plasma generators using the resist mask as a mask (e.g., see page 13, paragraph 94; page 31, paragraph 183; and Figures 16C and Figure 18A).

VI. GROUND OF REJECTION TO BE REVIEWED ON APPEAL

The final Office Action includes a single ground of rejection to be reviewed on appeal:

Claims 1, 3-6 and 13-18 stand rejected under 35 U.S.C. § 103(a), as being unpatentable over Ogawa (U.S. Patent Application Publication No. 2003/0132987; hereinafter “Ogawa”) in view of Mori et al. (Japanese Patent Publication No. JP-2000-169977; hereinafter “Mori”).

VII. ARGUMENT

The Rejection Under 35 U.S.C. § 103 should be Reversed

All Claimed Features not Taught or Suggested

As instructed in MPEP § 2143, to establish a *prima facie* case of obviousness, all claimed features must be taught or suggested by the applied references. The rejection cannot stand because neither the Ogawa publication nor the Mori publication teach or suggest the claimed combination of features including “forming a resist mask on the wiring using a second solution ejector,” as set forth in independent claims 1 and 13, and the similar feature of “forming a resist mask at least on the wiring using a solution ejector,” as recited in independent claim 3. Furthermore, the Ogawa and Mori documents fail to teach the claimed features of “etching the wiring using an atmospheric-pressure plasma device having a

plurality of linearly-arranged plasma generators using the resist mask as a mask,” as recited in independent claims 13-15.

No Proper Motivation is Provided for the Proposed Modification

MPEP § 2143 also instructs that to establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference teachings. To the contrary, there is no suggestion in Ogawa or Mori that would have led one of ordinary skill in the art to modify the Ogawa reference to include the claimed processes of forming a resist mask on the wiring and etching the wiring using an atmospheric-pressure plasma device using the resist mask as a mask, as claimed.

The foregoing deficiencies are now discussed in detail with respect to the appealed claims.

Independent Claim 1

Independent claim 1 recites a combination of features including *inter alia* “forming wiring using a first solution ejector for ejecting a conductive material ... forming a resist mask on the wiring using a second solution ejector.” Appellants respectfully submit that neither Ogawa nor Mori teaches or suggests these claimed features.

Ogawa

In the final Office Action, the Examiner asserts that paragraphs 0058, 0109 and 0234 of the Ogawa et al. publication describes forming a resist mask on a wiring using a second solution ejector (see page 2 of the final Action). It is respectfully submitted, however, that the description in paragraph 0058 of using an ejection head to form a resist does not teach or suggest so forming a resist on a wire, much less a wire that was formed using a first solution ejector. Rather, with respect to forming wires, paragraph 0232 of the Ogawa publication states, “metal material in the liquid form is selectively ejected from the heads to thereby form metal wiring on a substrate.” The *selective deposition* of wiring described in Ogawa does not

teach or suggest the claimed combination of specific features related to forming a resist on wiring using a solution ejection.

In response to these points presented in Appellant's Request for Reconsideration filed on October 1, 2006, the Examiner asserts, on page 2 of the Advisory Action dated October 27, 2006, "Ogawa [clearly teaches] forming a resist mask as a mask on the wiring (metal) (see Fig. 29 [and] paragraph 182) using a solution ejector to form a resist mask (see paragraph# 58, 109, 234)." However, the processes described in connection with Figure 29 do not mention or suggest forming a resist on a wire using a solution ejector, as claimed. To the contrary, the processes shown in Figure 29 involve spin coating metal layers with a photoresist layer (see, paragraph 0182, lines 2-4 and paragraph 0183, lines 2-3). Moreover, while paragraph 109 describes a liquid droplet ejection device and paragraph 0234 mentions a resist-forming method involving liquid droplet injection heads, there is no mention whatsoever of using such a device or technique to form a resist layer as a mask on a wiring layer, as claimed. Thus, none of paragraphs 0058, 0109, 0182, 0234, and Figure 29 teaches or suggests "forming a resist mask on the wiring using a second solution ejector," as claimed.

The next recited feature of claim 1 involves "etching the wiring using an atmospheric-pressure plasma device having a linear plasma generator using the resist mask as a mask." With respect to this claimed feature, the Examiner refers to paragraph 0184. However, Ogawa describes, at paragraphs 0184 and 0200-0204, that a plasma treatment process is only used for increasing ink wettability (see, steps S4 and S5 of Figure 29) or to form "ink affinity-imparting surfaces" and "ink-repelling-imparting surfaces" (see, Figures 33 and 34), which do not appear to involve a mask, much less the claimed mask using the resist as a mask. Nowhere else in the Ogawa publication is a plasma treatment process described in connection with etching a wiring using a resist as a mask, as set forth in claim 1.

Mori

On page 3 of the final Office Action, the Examiner asserts that Mori teaches etching a metal layer using high frequency plasma under atmospheric pressure. However, Appellants respectfully submit that Mori's English language abstract does not remedy the deficiencies

pointed out with respect to Ogawa because Mori fails to disclose the claimed feature of forming a resist mask on the wiring using a second solution ejector...etching the wiring using an atmospheric-pressure plasma device having a linear plasma generator using the resist mask as a mask, as recited in claim 1, and similar features set forth in independent claim 3. Thus, even if one were to consider a combination these documents, for the sake of argument, any such combination would not have taught or suggested the combinations of specific features set forth in Appellants' claims.

No Suggestion for the Proposed Modification

As pointed out above, the metal forming processes described in Ogawa involve (1) first *spin coating* a photoresist on a metal layer, and thereafter etching the metal using an etching liquid mainly composed of hydrochloric acid (see, paragraph 0182, lines 11-12); and (2) forming metal wiring connections between a driver and electrodes of a liquid crystal device, and metal wiring connected between TFTs or the like and electrodes of an organic EL device by *selectively ejecting* metal material in liquid form (see, paragraph 0232). However, these metal forming techniques of selective deposition and etching, as described in Ogawa, do not involve forming a resist mask on the wiring using a second solution ejector...etching the wiring using an atmospheric-pressure plasma device having a linear plasma generator using the resist mask as a mask, as recited in claim 1. The Mori document does not remedy the shortcomings of Ogawa. While Mori discloses a way to etch metal using atmospheric pressure high frequency plasma, it is too general and does not mention or suggest a masking process of any kind. Thus, Mori does not teach the claimed features of forming a resist mask on the wiring using a second solution ejector...etching the wiring using an atmospheric-pressure plasma device having a linear plasma generator using the resist mask as a mask. Therefore, outside Appellant's own disclosure, there is no suggestion for the modification suggested by the Examiner within the purview of Section 103.

For at least these reasons, the Examiner has failed to establish a *prima facie* case of obviousness. The rejection of claim 1, therefore, is improper and should be reversed.

Independent Claim 3

Independent claim 3 recites the processes of “forming wiring ... forming a resist mask at least on the wiring using a solution ejector ... etching the wiring using an atmospheric-pressure plasma device having a linear plasma generator using the resist mask as a mask.” Claim 3 differs from claim 1 in that the recited process of forming the wiring does not necessarily require a solution ejector. However, this rejection should be reversed at least for reasons analogous to those given above with respect to independent claim 1 because the Ogawa and Mori publications also fail to teach or suggest all limitations recited in claim 3, which includes *inter alia* the features of “forming a resist mask at least on the wiring using a solution ejector ... etching the wiring using an atmospheric-pressure plasma device having a linear plasma generator using the resist mask as a mask,” and, as pointed out above, because there is no proper motivation in Mori and Ogawa for combining these teachings as suggested by the Examiner.

Independent Claims 13-15

Claims 13-15 each recite *inter alia* the features of “etching the wiring using an atmospheric-pressure plasma device having a plurality of linearly-arranged plasma generators using the resist mask as a mask.” In the final Office Action, the Examiner acknowledges these features are not disclosed in Ogawa or Mori et al., but she goes on to cite *St. Regis Paper Co. v. Bemis Co. Inc.* 193 USPQ 8 (7th circuit 1997) and concludes that it would have been obvious to one of ordinary skill in the art to etch the wiring layer using a plurality of linearly-arranged plasma generators to etch the wiring layer since it is well-known in the art to repeat the same process for multiple effect. However, as pointed out in Appellant’s response of March 13, 2006, the examiner fails to advance any factual basis to supply the admitted deficiencies of the Ogawa publication with regard to the subject matter recited in independent claims 13-15. Instead, the Examiner attempts to bridge Ogawa’s evidentiary gaps by resort to so-called *per se* rules of obviousness allegedly established by the *St. Regis Paper Co.* case. Such rules do not exist, however, and the reliance thereon by the Examiner to establish obviousness under § 103(a) is improper. See *In re Ochiai*, 71 F.3d 1565, 1570,

37 USPQ2d 1127, 1132 (Fed. Cir. 1995); *In re Wright*, 343 F.2d 761, 769-70, 145 USPQ 182, 190 (CCPA 1965).

Additionally, Appellant pointed out that the holding in the *St. Regis Paper Co.* case is related to the concept of *durability* or *strength* resulting from a provision of multiple piles in a paper bag. Both the plaintiff and the defendant in *St. Regis* demonstrated that use of multiple layers to achieve the effect of “many bags within one” was known for many years. In contrast, the Examiner applies no similar evidence that it was well-known to “etching the wiring using an atmospheric-pressure plasma device having a plurality of linearly-arranged plasma generators using the resist mask as a mask,” as claimed. Thus, lacking any apparent nexus between holding in *St. Regis Paper Co.* and the present claimed features, and evidence that would be required to establish a *prima facie* case of obviousness for the admittedly missing feature, the rejection of claims 13-15 improper.

Furthermore, Appellant asserted that the Examiner’s unsubstantiated allegation on page 3 of the Action that “it is well known in the art to repeat the same process for multiple effect,” is too general, and does not teach or suggest the combination of specific features recited in the claim.

In the “Response to Arguments” section on page 4 of final Office Action, the Examiner appeared to have misunderstood the above arguments presented in Appellant’s Amendment dated March 13, 2006, with respect to *St. Regis Paper Co. v. Bemis Co. Inc.* 193 USPQ 8 (7th circuit 1997). Specifically, the Examiner states:

Applicant contends that the case law *St. Regis paper, Co. V. Bemis Co. Inc.* 193 USPQ 8, 11 (7th circuit 1977) does not exist. In response to applicant that this case law still exist (see USPQ for detail).

However, Appellant made no such statement (*i.e.*, that the case law does not exist). Rather, Appellant pointed out that the Examiner was attempting to bridge Ogawa’s evidentiary gaps by resorting to so-called *per se* rules of obviousness, allegedly established by the cited case law, but that no such rules exist. Furthermore, the facts in the *St. Regis Paper Co.* case include both parties agreeing that a claimed feature involving use of multiple layers to achieve the effect of many bags within one was known in the industry for many

years. In contrast, the Examiner failed to show any teaching whatsoever of “a plurality of linearly-arranged plasma generators ...,” as claimed.

In addition, the Examiner mentions *In re Woodruff* 919 F.2d 1575, 1578 (Fed. Cir. 1990), and asserts, “Where patentability is said to be based upon a particular chosen limitation or upon another variable recited in the claim, the Appellants must show that the chosen limitations are critical.” Appellants respectfully submit, however, that the holding in *Woodruff* related to criticality of overlapping ranges, is irrelevant to the claimed subject matter including “a plurality of linearly-arranged plasma generators” In fact, the statement in the Action concerning *Woodruff*, “Where patentability is said to be based upon ... the applicant must show that the chosen limitations are critical,” is too broad, not based on evidence from the prior art, and more significantly, it is not representative of the actual decision in this case. Indeed, the facts considered in *Woodruff* include a prior art reference that explicitly taught a concentration of carbon monoxide (CO), which overlapped with a claimed concentration of CO recited in one of the Appellants’ claims. In the instant case, the applied publications do not teach or suggest the claimed features of “a plurality of linearly-arranged plasma generators.....” Because a “plurality” necessarily requires more than one, and the Examiner failed to provide any reference that teaches this claimed feature, much less “linear-arranged plasma generators....” Furthermore, the Examiner admitted that both Ogawa and Mori fail to teach or suggest “a plurality of linearly-arranged plasma generators” Accordingly, no *prima facie* case of obviousness has been established. Because there is no range claimed in the context of the holding in *In re Woodruff*, there simply is no parallel to be drawn from the *Woodruff* case that would support the Examiner’s position.

The Examiner’s reliance on *St. Regis Paper Co.* and *In re Woodruff* is misplaced and certainly does not teach the claimed features admittedly missing in Ogawa and Mori. For at least these reasons, this rejection should be reversed.

Moreover, claims 13 and 15 each recite forming a resist mask on the wiring using a second solution ejector. As pointed out above, however, Ogawa and Mori fail to teach or suggest these features. Additionally, there is nothing in the Ogawa and Mori documents that would have suggested modifying Ogawa in such a way to arrive at Appellant’s claimed

process of “etching the wiring using an atmospheric-pressure plasma device ... using the resist as a mask,” as recited in each of claims 13-15. Thus, the rejection of claims 13-15 should be reversed for these additional reasons.

Dependent Claims 5 and 17

Claims 5 and 17 require that “when a wiring material, or a resist, or the like is ejected using the solution ejector, a substrate is heated.” In connection with these claimed features, the Examiner points to paragraphs 0201 and 0227. However, paragraph 0227 does not mention a heating process, and the heating process described in paragraph 0201 is part of a heating process that is carried out only while treating surfaces with different plasmas to make them either ink-repellant or have an affinity for ink (see, paragraphs 0200 to 0203). After these plasma treatments are completed, the substrate is cooled (see, paragraph 0204). Hence, the parts of the Ogawa publication relied upon do not teach or suggest heating a substrate as claimed. Additionally, the English language abstract of the Mori document mentions nothing about solution ejectors, much less heating a substrate while using a solution ejector. Accordingly, claims 5 and 17 each recite separately patentable subject matter not taught or suggested by Ogawa.

Because remaining rejected claims 4, 6, 16 and 18 depend from one of claims 1, 3 and 13-15, Appellants earnestly submit that these dependent claims are also patentable over the above-cited references, for at least the reasons set forth hereinabove, and further for the additional features recited.

VIII. CONCLUSION

For all the above reasons, Appellants respectfully submit that the Office Action has failed to establish *prima facie* obviousness with respect to claims 1, 3-6 and 13-18. Accordingly, Appellants respectfully request the Board to reverse the final rejection of these claims.

Respectfully submitted,
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Date: December 13, 2006

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IX. CLAIMS APPENDIX

1. A method for producing a semiconductor device comprising:
forming wiring using a first solution ejector for ejecting a conductive material,
forming a resist mask on the wiring using a second solution ejector, and
etching the wiring using an atmospheric-pressure plasma device having a linear
plasma generator using the resist mask as a mask.
3. A method for producing a semiconductor device comprising:
forming wiring,
forming a resist mask at least on the wiring using a solution ejector, and
etching the wiring using an atmospheric-pressure plasma device having a linear
plasma generator using the resist mask as a mask.
4. The method for producing the semiconductor device in any one of claim 1 and
claim 3, wherein the solution ejector has one or more of solution ejection ports.
5. The method for producing the semiconductor device in any one of claim 1 and
claim 3, wherein when a wiring material, or a resist, or the like is ejected using the solution
ejector, a substrate is heated.
6. The method for producing the semiconductor device in any one of claim 1 and
claim 3, wherein the etching and/or ashing are/is processed at the atmospheric pressure or
near-atmospheric pressure.
13. A method for producing a semiconductor device comprising:
forming wiring using a first solution ejector for ejecting a conductive material,
forming a resist mask on the wiring using a second solution ejector, and
etching the wiring using an atmospheric-pressure plasma device having a plurality of
linearly-arranged plasma generators using the resist mask as a mask.
14. A method for producing a semiconductor device comprising:

forming wiring using a solution ejector for ejecting a conductive material,
forming a resist mask at least on the wiring, and
etching the wiring using an atmospheric-pressure plasma device having a plurality of linearly-arranged plasma generators using the resist mask as a mask.

15. A method for producing a semiconductor device comprising:
forming wiring,
forming a resist mask at least on the wiring using a solution ejector, and
etching the wiring using an atmospheric-pressure plasma device having a plurality of linearly-arranged plasma generators using the resist mask as a mask.

16. The method for producing the semiconductor device in any one of claim 13 to claim 15, wherein the solution ejector has one or more of solution ejection ports.

17. The method for producing the semiconductor device in any one of claim 13 to claim 15, wherein when a wiring material, or a resist, or the like is ejected using the solution ejector, a substrate is heated.

18. The method for producing the semiconductor device in any one of claim 13 to claim 15, wherein the etching is processed at the atmospheric pressure or near-atmospheric pressure.

X. EVIDENCE APPENDIX

There is no related evidence to submit at this time.

XI. RELATED PROCEEDINGS APPENDIX

There are no related proceedings to this Appeal.